MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole Log Data Report

Log Event A

Borehole 10-00-06

Borehole Information

Farm : A	**Tank :** A	**Site Number :** 299-E25-15
N-Coord : 41,125	**W-Coord :** 47,651	**TOC Elevation :** 689.73
Water Level, ft : 288.90	**Date Drilled :** 7/31/1969	

Casing Record

Type : Steel-welded	Thickness, in. : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 340	
Type : Steel-welded	Thickness, in. : 0.250	ID, in. : 4
Top Depth, ft. : 0	Bottom Depth, ft. : 265	

Borehole Notes:

Borehole 10-00-06 was originally drilled in July 1969 to a depth of 340 ft using 6-in. casing. The driller's log indicates that the casing was perforated from 338 to 270 ft, and during well completion, sand flowed into the well (apparently through the perforations) and filled the well to a depth of 296 ft. In September and October 1976, the casing was perforated from 260 to 90 ft and from 20 ft to the ground surface; a 4-in. casing and packer were installed from the ground surface to 265 ft. The driller's log notes that the borehole was perforated, but provides no details as to which portions of the borehole were grouted or how much grout was used. On the basis of the information provided in Chamness and Merz (1993), the annular space between the 6-in. and 4-in. casings was apparently grouted.

The casing thickness for the 6-in. borehole is assumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. casing and 0.237 in. for the 4-in. casing.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 10/1996	**Calibration Reference :** GJO-HAN-13	**Logging Procedure :** P-GJPO-1783

Logging Information

Log Run Number : 1	**Log Run Date :** 01/10/1997	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 0.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 42.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Borehole 10-00-06

Log Event A

Log Run Number :	3	**Log Run Date :**	01/14/1997	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	103.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	165.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	4	**Log Run Date :**	01/15/1997	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	234.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	164.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Logging Operation Notes:

This borehole was logged in four log runs. Water was encountered in the borehole at 288.9 ft. The total logging depth achieved by the SGLS was 234 ft.

Analysis Information

Analyst : D.L. Parker

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 04/01/1998

Analysis Notes :

The pre- and post-survey field verification spectra for all logging runs met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from these spectra were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

An appropriate casing correction factor for the thickness of the two sections of casing was not available for application during data reduction; a correction factor for 0.5-in.-thick casing was applied. Of the casing correction factors available for application, this one most closely matched the combined thickness of the 6-in. and 4-in. casings. However, no correction factor was available to account for the air and/or grout present between the two casings. The thickness and density of the grout could not be determined; therefore, a correction for the attenuating effects of the grout could not be determined.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

Log Event A

Borehole 10-00-06

Results/Interpretations:

The only man-made radionuclide detected in this borehole was Cs-137. Cs-137 contamination was detected almost continuously from the ground surface to 2.5 ft, continuously from 9 to 26 ft, and intermittently from 33.5 to 231 ft.

The plot of naturally occurring radionuclides shows the KUT concentrations decrease at a depth of about 40 ft. U-238 concentrations increase gradually from about 60 to 70 ft, decrease sharply at about 104 ft, and remain suppressed to the bottom of the logged interval (234 ft). K-40 and Th-232 concentrations increase below 110 ft and are somewhat erratic to the bottom of the logged interval.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank A-103.